

**REMARKS**

Claims 1-13 are pending in the application after entry of this amendment. Claims 1-3, 9-10, and 13 have been amended to clarify the subject matter which Applicants regard as the invention. Specifically, claims 1-3 and 13 have been amended to clarify that a “cycle unit” is a “cyclical time unit.” Support for this amendment can be found throughout the specification (e.g., at page 5, lines 22-23, and page 17, line 25 of the previously filed English translation). Also, claim 1 has been amended to be in more proper format by adding the transitional clause “comprising.” Claim 14 has been cancelled as being unelected.

**I. REJECTION OF CLAIMS UNDER 35 U.S.C. § 102 / § 103**

**A. Rejection of Claims 1-13 under 35 U.S.C. § 102(b) / § 103(a)**

The Office Action has rejected claims 1-13 under 35 U.S.C. § 102(b), as allegedly being anticipated by, or in the alternative, under 35 U.S.C. § 103(a), as allegedly being obvious over Mazzotti (Journal of Chromatography, 769 (1997), pages 3-24). Applicants respectfully disagree with this rejection for the following reasons.

As an initial matter, the claims of the present invention are neither anticipated by nor obvious over Mazzotti. The Office Action fails to specifically point out which features of the rejected claims are anticipated by Mazzotti, and simply alleges that the rejected claims read on Mazzotti. The Office Action further alleges that “if a difference exists between the claims and Mazzotti,” the differences amount to an obvious optimization of the steps of Mazzotti. The present invention is patentably distinct from Mazzotti and is not merely an optimization of the steps of Mazzotti.

The present invention is directed to a process for chromatographically separating components of a multiple component fluid mixture by means of a Simulated Moving Bed (SMB) process, wherein the connection ports of the first and second inlets and outlets are repositioned between two respective chambers or chamber sections forming a closed circuit at the end of a cyclical time unit, and wherein *the concentration of the input multiple component fluid mixture and/or composition of the solvent is/are changed within the cycle time unit.* (*emphasis added*)

The SMB unit of Mazzotti achieves a stationary regime which is steady state, in which the unit exhibits the same time dependent behavior during each time period between two successive switches. Mazzotti fails to disclose that the concentration of the input multiple-component fluid mixture is intentionally changed periodically. Mazzotti also fails to disclose or suggest that the composition of the solvent is changed.

In fact, Mazzotti describes, at page 4, that an SMB unit achieves a stationary regime which is cyclic steady state, in which the unit exhibits the same time dependent behavior during each time period between two successive switches. Thus, the SMB operating parameters of Mazzotti are constant at least during each time period (e.g., the “cycle unit” or “cyclical time unit” recited in the claims of the present invention) between two successive switches of the inlet and outlet ports. Mazzotti neither discloses nor suggests the feature of the present invention wherein an operating parameter is changed *within a cycle unit* of the SMB process. Specifically, Mazzotti fails to disclose or suggest that the concentration of the input multiple component fluid mixture and/or a composition of the solvent is/are changed within each cycle unit, as recited in claim 1:

Further, Mazzotti, at page 17, figure 9, displays the relationship between productivity and the feed concentration. It should be noted that the feed concentration is constant in time. With respect to the calculation of the displayed relationship (page 17, left column, last paragraph), Mazzotti states that:

all these parameters are calculated analytically by using their definitions and the ...Eqs. (43-46), constant values of all other parameters appearing in Eqs. (38) and (42) have been used.

While Mazzotti does not explicitly state that the concentration in these equations has been kept constant, the equations presented do not lend any other reasonable interpretation. In contrast, if the feed concentration was variable in time, relatively complicated numerical calculations would be required. Moreover, Mazzotti does not describe any restrictions or limitations with respect to the validity of the presented calculations.

Moreover, there is no teaching or suggestion in Mazzotti regarding the change of an operating parameter within a cycle unit that would have rendered the present invention obvious. The process of the present invention can provide increased productivity of a chromatographic

process over a conventional process. For example, as described in the specification at page 11, lines 26-36 (of the English translation), an increase in productivity, defined as the mass of the purified multiple-component fluid mixture per time unit and the solid, of 33 % can be achieved. Thus, Mazzotti does not anticipate and would not have rendered obvious the present invention. Accordingly, this rejection should be withdrawn.

**B. Rejection of Claims 2, 3, and 7-10 under 35 U.S.C. § 103(a)**

The Office Action has rejected claims 2, 3, and 7-10 under 35 U.S.C. § 103(a), as allegedly being obvious over Mazzotti, in view of U.S. Patent No. 5,422,007 to Nicoud (hereinafter “Nicoud”). Applicants respectfully disagree with this rejection for the following reasons.

As an initial matter, neither Mazzotti nor Nicoud, alone or in combination, would have rendered the present invention obvious. As described above with respect to the rejection of claims 1-13, Mazzotti neither teaches nor suggests the change of an operating parameter within a cycle unit of the SMB process.

The Office Action alleges that Nicoud discloses that varying the temperature and pressure allows for varying of the eluting power of the eluting fluid, and that it would therefore have been obvious to change temperature and pressure. In fact, Nicoud at, for example, column 8, lines 58 to 62, states that “it is very difficult to modify the temperature of granular beds in large scale installations and it is therefore not easy to modify the eluting power simply by varying the pressure of the eluent.” Nicoud further states that one of the embodiments consists of “maintaining substantially the same pressure and eluting power in all columns.” The disclosure of Nicoud teaches away from one of the features of the present invention, namely changing an operating parameter within the cycle unit. Moreover, Nicoud fails to teach or suggest that the pressure or the temperature can be changed within the cycle unit. Thus, even if Mazzotti and Nicoud were to be combined, it would not result in the claimed invention. Accordingly, this rejection should be withdrawn.

**C. Rejection of Claims 7, 9, and 10 under 35 U.S.C. § 103(a)**

The Office Action has rejected claims 7, 9, and 10 under 35 U.S.C. § 103(a), as allegedly being obvious over Mazzotti, in view of PCT publication WO 00/33934 to Jensen (hereinafter “Jensen”). Applicants respectfully disagree with this rejection for the following reasons.

As an initial matter, neither Mazzotti nor Jensen, alone or in combination, would have rendered the present invention obvious. As described above with respect to the rejection of claims 1-13, Mazzotti neither teaches nor suggests the change of an operating parameter within a cycle unit of the SMB process.

The Office Action alleges that Jensen discloses the use of solvents with different capabilities to achieve cost savings in organic solvent, and that it would therefore have been obvious to use different compositions in Mazzotti, allegedly rendering claims 9 and 10 obvious over the combination of Mazzotti and Jensen.

In fact, Jensen discloses that sets of solvent liquids are selected to have varying capability for removing an adsorbed compound from a sorbent material, and that by suitable selection it becomes possible to obtain a product stream in which the product is more concentrated than in the feed stream. However, neither Jensen nor any of the other cited documents disclose that the solvent contains components which are to be separated. Thus, the combination of Mazzotti and Jensen would not have rendered the present invention obvious and this rejection should be withdrawn.

**D. Rejections of Claim 13 under 35 U.S.C. § 103(a)**

The Office Action has rejected claim 13 under 35 U.S.C. § 103(a), as allegedly being obvious over Mazzotti, in view of U.S. Patent No. 5,618,972 to Funk (hereinafter “Funk”). The Office Action has also rejected claim 13 under 35 U.S.C. § 103(a), as allegedly being obvious over Mazzotti, in view of U.S. Patent No. 5,102,533 to Kearney (hereinafter “Kearney”). Applicants respectfully disagree with this rejection for the following reasons.

As an initial matter, neither Mazzotti nor Funk nor Kearney, alone or in any combination, would have rendered the present invention obvious. As described above with respect to the rejection of claims 1-13, Mazzotti neither teaches nor suggests the change of an operating parameter within a cycle unit of the SMB process.

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The Office Action alleges that Funk (col. 3, lines 24 to 30) discloses that reactive chromatography in a simulated moving bed allows the separation of at least one component while the reaction proceeds. Applicants respectfully disagree with this characterization. In fact, this passage discloses that a fixed catalyst bed and a reactive chromatography simulated moving bed can be combined to improve the effectiveness of the fixed catalyst bed and the cost efficiency of the simulated moving bed.

The Office Action alleges that Kearney discloses that varying the flow volume allows increased production, increased component recovery, and/or increased component stream purity, and that therefore it would have been obvious to vary the flow volume in Mazzotti. The Office Action fails to acknowledge that a feature of claim 13 is the change *within one cycle unit*. Kearney discloses that “the flow rates through the various individual sorbent compartments are controlled to modify the specific steady state waveform characteristics of the process with respect to the conventional SMB process. In particular, the steady state waveform is modified by any combination of operating in a non-constant manner as a function of time at any time during a step: (1) the recirculation flow rates, (2) the inlet flow and (3) the outlet flow. There is no suggestion in Kearney to change the input multiple component fluid mixture and/or a composition of the solvent within the cycle unit or otherwise.

Kearney discloses changing within the cycle unit the flow rates through the compartments, but does not teach or suggest changing a pressure or temperature of the input fluids. Thus, even if Mazzotti and Kearney were combined, the resulting combination would not produce the claimed invention. Accordingly, this rejection should be withdrawn.

**CONCLUSION**

As all of the rejections in the Office Action have been overcome, Applicants request that a Notice of Allowance be issued. A Credit Card Payment Form PTO-2038 is enclosed authorizing payment in the amount of \$ 810.00, representing the fee for a Request for Continued Examination under 37 C.F.R. § 1.17(e). This amount is believed to be correct; however, the Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 14-0629.

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Respectfully submitted,

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**CERTIFICATE OF MAILING UNDER 37 C.F.R. § 1.8**

I hereby certify that this correspondence, including any items indicated as attached or included, is being deposited with the United States Postal Service as first class mail in an envelope addressed to: MAIL STOP RCE, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the date indicated below.

*Mitchell Katz*  
Mitchell A. Katz

*9 January 2008*  
Date